Probabilistic aspects of persistent homology

Tomoyuki SHIRAI (IMI, Kyushu Univ.) [*]

Persistent homology appeared around 2000 as an algebraic method which measures topological features of objects or point cloud data. Recently, much attention has been paid to it in the context of Topological Data Analysis (TDA). Persistent homology describes, roughly speaking, the birth and death of topological feature (connected components, holes, voids, and so on) of an increasing sequence of topological objects. Connected components of random objects have been studied for long time in probability theory, especially, in percolation theory and random geometric graph theory. Persistent homology theory sheds new light on such topics in several ways.

In this talk, we would like to discuss some topics on persistent homology for random objects like point cloud data, random simplicial complexes, in particular, limit theorems for functionals of persistent homology.